Global Scientific JOURNALS

GSJ: Volume 7, Issue 10, October 2019, Online: ISSN 2320-9186
www.globalscientificjournal.com

UTILIZATION OF PAPAYA MICRO SIMPLICIA IN THE FEED ON SURVIVAL RATE AND GROWTH OF GIANT FRESHWATER PRAWN (*MACROBRACHIUM ROSENBERGII*) JUVENILE

Rita Rostika[1], Kiki Haetami[1], Iskandar[1] and Muwahid Izhharil Haq[2]

[1]*Lecturer at Faculty of Fisheries and Marine Science, Padjadjaran University, Bandung – Sumedang KM. 21 Jatinangor 45363, Indonesia*
[2]*Student at Faculty of Fisheries and Marine Science, Padjadjaran University, Bandung – Sumedang KM. 21 Jatinangor 45363, Indonesia E- mail address: izhharmuwahid@gmail.com*

KeyWords
Papaya Micro simplicia, Giant Freshwater Prawn, Daily Growth Rate, Feed Utilization Efficiency, Survival rate.

ABSTRACT

Feed is one of the main factors in supporting growth in giant freshwater prawn (*Macrobrachium rosenbergii*) farming. Addition of papain in the feed can optimize the utilization of protein by giant freshwater prawns. Papain is derived from papaya. Papain is a protease enzyme that is able to hydrolyze proteins. The purpose of this research were to determine the optimal dose of papaya micro simplisia in feed on survival and growth of giant prawns. The research used experimental method by completely randomized design (CRD) with 5 treatments and 3 replications. The treatment consists of 0% papaya micro simplisia (A); 2.25% papaya micro simplisia (B); 3.75% papaya micro simplisia (C); 5.25% papaya micro simplisia (D) and 6,75% papaya micro simplisia (E). The observed variables in this study were survival rates, daily growth rates, and feed utilization efficiency. The results showed that survival rates, daily growth rates, and feed utilization efficiency did not differ significantly among each treatments. However, the addition of papaya micro simplisia dose to feed as much as 3.75% gives the highest value on survival rates (82%), daily growth rates (1.74%/day), and feed utilization efficiency (40%).

INTRODUCTION

Giant freshwater prawn (*Macrobrachium rosenbergii)* is one of the main fisheries commodities in Indonesia due to its high economic value[1]. Recently giant freshwater prawn culture has increased. However, problems still occured due to lack of technology mastery and socialization of giant prawn culture system.

Intensive and semi-intesive feeding in shrimp culture is the main factor in aquaculture development. Feed is one of the biggest inputs in production cost reaching in total of 60% [2]. Juvenile stage is a crucial stage due to its really sensitive to feed availability. As with other biotas, the digestive system of shrimp in the initial stage is still simple.

The function of enzymes in feed can help to speed up the digestion process so that nutrients can be sufficiently available for shrimp to grow. Papain enzyme classified as a protease enzyme that can be found in papaya fruit. Papain enzyme can break down proteins into a simpler form, namely peptides and amino acids, due to papain enzyme can catalyze hydrolysis reaction. Enzyme addition to feed can increase feed efficiency that causes an increase in growth rate due to the level of protein absorption that will increase [3]. Papain enzymes can usually found in several forms, one of them in simplicia form.

Simplisia consists of three groups, namely vegetable, animal, and mineral. One of the simplicia from vegetable material is papaya simplicia [4]. Simplisia papaya shown in increasing of the growth rate and survival rate of tiger groupers [5], siganus fish [6], tilapia [7], catfish [8] and carp [9]. The purpose of this research is to obtain a microdose of papaya simplisia in a feed that can produce the best survival rate and growth rate of giant prawn seeds.

MATERIAL AND METHODS

The research was conducted at Pamarican Coordinating Center for the Development of Brackish and Sea Fish Juvenile (BPBIAPL), Pamarican District, Ciamis Regency, West Java Province during March to April 2019.

The research was conducted by using an experimental design with a Completely Randomized Design (CRD) consisting of 5 treatments and 3 repetition as follows :

1. Treatment A : 0% (control) of Micro-simplisia addition
2. Treatment B : 2,25%. of Micro-simplisia addition
3. Treatment C : 3,75% of Micro-simplisia addition
4. Treatment D : 5,25%. of Micro-simplisia addition
5. Treatment E : 6,75 %. of Micro-simplisia addition

Parameters measured in this research is survival rate, daily growth rate, and feed efficiency, while observation of growth can be seen from the increase in weight of shrimp juvenile.

Survival Rate

Survival rate calculated using the formula as follow [10] :

$$SR = \frac{Nt}{No} \times 100\%$$

Description:

SR = Survival of fish during the experiment (%).
Nt = Number of fish at the end of the experiment.
No = Number of fish at the beginning of the experiment

Daily Growth Rate

Daily Growth Rate calculated using the formula as follow [11]:

$$DGR = \frac{\ln Wt - \ln Wo}{t} \times 100\%$$

Description:

DGR = Daily Growth Rate
Wt = Weight of analyzed shrimp at the end of the research (g)
Wo = Weight of analyzed shrimp at the beginning of the research (g)
t = Shrimp Rearing (days).

Feed Utilization Efficiency

Feed Utilization Efficiency calculated by using the formula as follow [12] :

$$\text{FEU} = \frac{\text{Wt} - \text{Wo}}{\text{F}} \times 100\%$$

Description:
FEU = Feed Utilization.Efficiency (%)
Wt = Total weight of analyzed shrimp at the end of the research (g)
Wo = Total weight of analyzed shrimp at the beginning of the research (g)
F = Total of consumed feed during the research (g)

Water Quality Parameters

Measured water quality includes, temperature, dissolve oxygen, and pH by using thermometer, DO meter, and pH meter

Data Analysis

Obtained data were analyzed by using F test with a confidence level of 95%. Continued with Duncan's multiple region test to determine the differences between treatments if its has a significant effect on the analysis of variance (ANOVA) [13].

RESULTS AND DISCUSSION

Survival Rate

The addition of papaya micro simplicia in commercial feed did not have a significant effect on the survival rate of prawn in juvenile stadia. The results of this research are also in line with previous research who reported that the addition of papain enzymes did not have a significant effect on the survival rate of tilapia [7] and on the larvae of giant prawns fed by adding commercial papain enzymes [14].

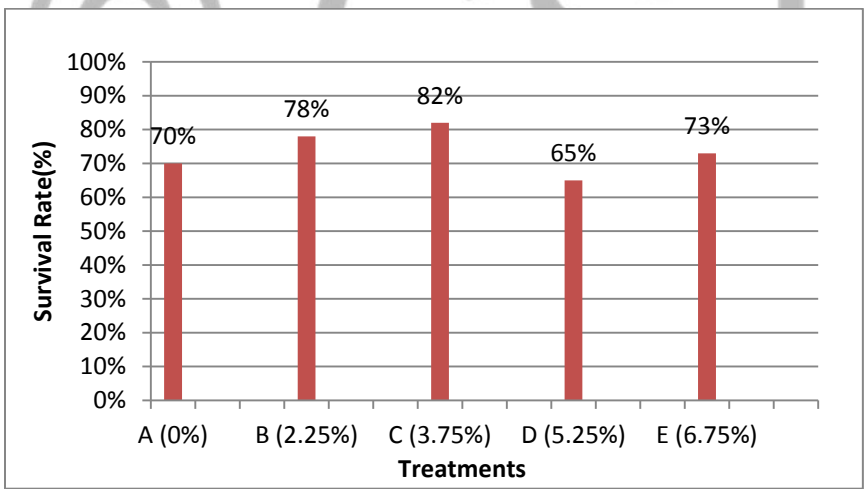

Figure 1. Graph of Giant Fresh Water Prawn Juvenile

The survival rate of giant prawns ranging from 65% - 82% and categorized as a good category, due to the shrimp during the research has met the protein requirement needs. The feed given has a protein content of ± 35%. The protein content of feeds used meets the requirements of giant prawn protein requirements, which is 30%, so that giant prawns have enough energy to adapt[15].

Daily Growth Rate

The results during 42 days of research found that the largest daily growth rate of shrimp juvenile was at the treatment dose of 3.75%, which amounted to 1.74% / day. This result is better than other studies of commercial papain enzymes at a dose of 0.1% that has a daily growth rate of giant prawn juvenile by 1.41% / day [14].

.

Table 1. Daily Growth Rate Average of Giant Freshwater Prawn in Juvenile Stages

Treatments	Daily Growth Rate (%)
A Control (0%)	1,37± 0,005[a]
B Papaya micro simplicia (2,25%)	1,69± 0,002[a]
C Papaya micro simplicia (3,75%)	1,74± 0,003[a]
D Papaya micro simplicia (5,25%)	1,52± 0,004[a]
E Papaya micro simplicia (6,75%)	1,49± 0,003[a]

Description : Values followed by the same lowercase letters indicate values that are not significantly different based on analysis of variance (ANOVA) at a 5% confidence level

The addition of papaya micro simplicia in commercial feed did not have a significant effect on the daily growth rate of giant freshwater prawns juvenile (Table 2). This is presumably due to the presence of tannins which are secondary metabolites in the papaya micro simplicia. Tannins can have a negative effect as an anti-nutritional agent. Anti-nutrient substances in tannins can bind with calcium, so these nutrients become less available in the body [16].

Growth activity of shrimp needs a lot of calcium mineral. The avabiality of calcium in feed can maintain the calcium balance in shrimp body so that the growth can be optimumized [17].

Feed Utilization Efficiency

According to table 2, it is shown that the feed utilization efficiency in each treatment has a higher value than the control treatment. The obtained value of the feed utilization efficiency ranging from 30-40%, but it cannot be considered as a good category. The feed can be considered as a good category if it has a value of feed efficiency that reaches 50% or close to 100% [7].

.

Table 2. Feed Efficiency Utilization Average of Giant Fresh Water Prawn

Treatment	Feed Efficiency (%)
A Control (0%)	30± 0,14[a]
B Papaya micro simplicia (2,25%)	36± 0,058[a]
C Papaya micro simplicia (3,75%)	40± 0,046[a]
D Papaya micro simplicia (5,25%)	34± 0,077[a]
E Papaya micro simplicia (6,75%)	33± 0,064[a]

Description : Values followed by the same lowercase letters indicate values that are not significantly different based on analysis of variance (ANOVA) at a 5% confidence level

The addition of papaya micro Simplicia on commercial feed did not have a significant effect on the efficiency of feed utilization. This was due to leaching out, which is the decay of dry matter caused by the length of feed immersion in water [18].

Leaching out causes the added papaya micro simplicia to become soluble in water so that the process of proteins breaking down to amino acids does not occur optimally. The immersion time of feed-in water which resulting in leaching out, influenced by the habit of eating shrimp that is slow and takes a long time to consume the feed given so that the feed is exposed for a long period in the water [19]..

Water Quality

In maintaining the water during the culture process, it has to meet water quality standards so that shrimp can grow optimally. Average water quality data that were observed during the research are shown in Table 3 as follows.

Table 3. Water Quality of Giant Fresh Water Prawn During The Culture

Treatments	DO (mg/L)	Temperature (^{o}C)	pH
A Control (0%)	7,6 – 8,6	28 - 34	7,45 – 7,50
B Papaya micro simplicia (2,25%)	7,6 – 8,7	28 - 33	7,51 – 7,54
C Papaya micro simplicia (3,75%)	7,6 – 8,6	28 - 33	7,46 – 7,50
D Papaya micro simplicia (5,25%)	7,6 – 8,6	28 - 33	7,49 – 7,50
E Papaya micro simplicia (6,75%)	7,7 – 8,6	28 - 33	7,46 – 7,50

Water temperature observed during the culture ranging from 28 ° - 34 ° C. This range meets the proper requirements for raising giant prawns. Prawns live optimally at water temperatures ranging from 28 ° - 30 ° C [15].

Dissolved oxygen during the research ranged from 7.6 - 8.7 mg / L. This range meets the proper requirements for the growth

of giant prawns. Optimal dissolved oxygen levels for giant prawns at least 3 mg / L, if, below 3 mg / L, it causes stress [15]. In general, giant prawns have low oxygen tolerance in a short time, and in these conditions, giant prawns become less active and there is a decrease in appetite, it also caused shrimp to became aggressive so that it attacks other shrimp [20]

The degree of acidity (pH) during the study ranged from 7.45 - 7.54, this range fulfills the prope requirements for the growth of giant prawns. Freshwater giant prawns grow optimally in aquatic environments with a pH of 7 - 8.5 [15]. If the pH is below 4.5 and above 9.0 shrimp survival and growth can be disrupted because the shrimp will be weak, easily sick, and decreased appetite.

.

Conclusion

Based on the research, can be assumed that the addition of papaya Simplicia on commercial feed does not have a significant effect on survival rate, daily growth rate, and feed utilization efficiency. However, the addition of papaya micro-Simplicia dose to feed as much as 3.75% gives the highest value on survival (82%), daily growth rate (1.74% / day), and efficiency of feed utilization (40%).

References

[1] Priyono, S.B., Sukardi dan S.M Harianja. 2011. P*engaruh Shelter Terhadap Perilaku dan Pertumbuhan Udang Galah (Marobrachium rosenbergii)*. *Jurnal Perikanan (J. Fish Sci*), XIII (2) : 78-85.

[2] Pramono, M.D., Endang S.R., dan Minar F. 2017. *Analisis Faktor - Faktor yang Mempengaruhi Produksi Pembenihan Ikan Lele Dumbo (Clarias Gariepunis) di Kabupaten Wonogiri*. Tesis. Universitas Sebelas Maret.

[3] Amalia, R., Subandiyono dan A. Endang. 2013. *Pengaruh Penggunaan Papain Terhadap Tingkat Pemanfaatan Protein Pakan dan Pertumbuhan Lele Dumbo (Clarias garepinus)*. Journal of Aquaculture Management and Technology, 2 (1) : 136-143.

[4] Maryam, S. 2017. *Isolasi Senyawa Flavonoid dari Biji Pepaya (Carica papaya L) dan Uji Aktivitasnya sebagai Antimikroba.* Skripsi, Universitas Negeri Semarang.

[5] Fadli, J., Sunaryo, dan Ali D. 2013. *Pemberian Enzim Papain pada Pakan Komersil Terhadap Pertumbuhan dan Efisiensi Pakan Ikan Kerapu Macan (Epinephelus fuscoguttatus)*. *Journal Of Marine Research,* 2 (3) : 50-57.

[6] Usman, Asda L., dan Erik S. 2014. *Suplementasi Crude Enzim Papain dalam Pakan Pembesaran Ikan Baronang (Siganus guttatus)*. Jurnal Perikanan XVI (1) : 10-16.

[7] Rostika, R., Sunarto, H.N Sugyanto dan L.P Dewanti. 2018. *The effectiveness of crude papain enzyme supplement for tilapia's (Oreochromis niloticus) growth at the floating nets of Cirata Reservoir*. IOP Conference Series: Earth and Environmental Science, 2 (1) : 1-6.

[8] Hutabarat, J., Diana R. dan Istiyanto S. 2016. *Pengaruh Enzim Protease Papain dalam Pakan Buatan Terhadap Pertumbuhan dan Net Protein Utilization Benih Lele Sangkuriang yang Dibudidaya di Desa Wonosari, Kecamatan Bonang, Kabupaten Demak. PENA Akuatik,*14 (1) : 25-35.

[9] Hasan, O.D.S. 2000. *Pengaruh Pemberian Enzim Papain dalam Pakan Buatan terhadap Pemanfaatan Protein dan Pertumbuhan Benih Ikan Gurame (Osphronemus gouramy Lac.)*. Tesis. Institut Pertanian Bogor.

[10] Sang, M.H., Ravi F. 2004. *Growth, survival, haemolymph osmolality and organosomatic indices of the western king prawn (Penaeus latisulcatus Kishinouye, 1896) reared at different salinities*. *Aquaculture*, 234 (1-4) : 601–614.

[11] Elliot, J.M, dan M.A Hurley. 1995. *Function Ecologi*. Volume IX. British Ecological Society, British.

[12] Tacon, A. G. J. 1987. T*he Nutrition and Feeding of Farmed Fish and Shrimp - A Training Manual : 1. The Essential Nutrients*. Food And Agriculture Organization. The United Nations. Brasilia, Brazil. 106 – 109.

[13] Gaspersz, V. 1991. *Metode Perancangan Percobaan untuk Ilmu-ilmu Pertanian, Teknik dan Biologi*. Buku. CV Armico. Bandung.

[14] Singh, H., dan D.W. Patil. 2014. Effect of papain supplemented diet on growth and survival of post -larvae of *Macrobrachium rosenbergii. International Journal of Fisheries and Aquatic Studies*, 1(6): 87 – 90.a.

[15] Badan Standarisasi Nasional. 2015. SNI : 6486.4:2015. *Udang galah (Macrobrachium rosenbergii de Man) Bagian 4 : Produksi Benih.* Badan Standarisasi Nasional. Jakarta. 11 hlm.

[16] Astawan, Made dan Andreas Leomitro Kasih. 2008. *Khasiat Warna-warni Makanan*. Jakarta: PT Gramedia Pustaka Utama. 320 hlm.

[17] Kanazawa, A. 1983. *Effects of phospholipids on aquatic animals*. *Feed Oil Abst.*, B (18): 1-5.

[18] Tarmizi, A. 2016. Evaluasi dosis *polymethylolcarbamide* pada *leaching out* nutrien dan pertumbuhan udang vaname (*Litopenaeus vannamei*). *Tesis*. Institut Pertanian Bogor.

[19] Epa, U.P.K., M.J.S Wijeyaratne, and S.S De Silva. 2007. *A Comparison of Proximate Composition and Water Stability of Three Selected Shrimp Feeds Used in Sri Lanka*. *Asian Fisheries Science*, 20:7-22.

[20] Evan, Y. 2009. *Uji Ketahanan Beberapa Strain Larva Udang Galah (Macrobrachium rosenbergii de Man)* Terhadap Bakteri *Vibrio harveyi*. Skripsi. Institut Pertanian Bogor.